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COMMENTS FOR TEXAS PUBLIC UTILITY COMISSION PROJECT #52373 SEPTEMBER 9, 2021

Executive Summary

I am a professor at the University of Texas at Austin – I have worked in both the area of energy markets and in the area of reliability of energy systems.

My comments regarding the questions posed by the PUC around demand response systems revolve around three themes:

- Current demand response systems do not recognize the system wide benefit of reducing demand, making them unattractive to individual load serving entities
- Demand response systems tied to market prices work well when prices are representative of the marginal cost of reducing demand in the system. They do not work well under emergencies, when prices may decouple from the marginal cost of reducing demand. For this reason it is important to consider a separate, *emergency* demand response system.
- Beyond load serving entities, other entities may also want to offer demand response systems, especially if they can be coupled with other products – for example generation of energy. The result of such bundles could be increased reliability for generation. To provide incentives for such programs, the Commission should consider providing financial incentives for improved reliability.

The common thread that runs across these themes is the need for demand response programs to recognize the system-wide impact of improved reliability and reduced demand – and the design of incentives that take this impact into account.

Some of my comments are based on my published research, others on a request for proposals by ARPA-E on improving grid reliability.

- Vishwakant Malladi, Rafael Mendoza-Arriaga, and Stathis Tompaidis. 2020. Modeling Dependent Outages of Electric Power Plants. *Operations Research* 68(1), 1-15.
- Baldick, Ross, Kolos, Sergey, and Stathis Tompaidis. 2006. Interruptible Electricity Contracts from an Electricity Retailer's Point of View: Valuation and Optimal Interruption. *Operations Research* 54, 627-642.
- PERFORMANCE-BASED ENERGY RESOURCE FEEDBACK, OPTIMIZATION, AND RISK MANAGEMENT (PERFORM) DE-FOA-0002171. Department of Energy - Advanced Research Projects Agency – Energy, https://arpa-e.energy.gov/

I expand on these themes in my comments to the individual questions.

Sincerely,

Stathis Tompaidis

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1. Describe existing and potential mechanisms for residential demand response in the ERCOT market.
    a. Are consumers being compensated (in cash, credit, rebates, etc.) for their demand response efforts in any existing programs today, and if not, what kind of program would establish the most reliable and responsive residential demand response?
    b. Do existing market mechanisms (e.g., financial cost of procuring real time energy in periods of scarcity) provide adequate incentives for residential load serving entities to establish demand response programs? If not, what changes should the Commission consider?

Comment. I do not have a comment on question 1a. Regarding question 1b, existing market mechanisms provide incentives for residential load serving entities to establish demand response programs that are limited. In particular, existing incentives recognize the immediate benefit to the load serving entity; e.g. by avoiding the financial cost of procuring real time energy at times when the cost is high. But they do not recognize the benefit due to a successful reduction of demand to other entities across ERCOT. For example, a reduction of demand at a time of scarcity due to the exercise of the demand response system by Austin Energy benefits Austin Energy because it does not need to procure energy at high prices. But it also benefits every other load serving entity across ERCOT: since demand is reduced, the marginal price settles at a price that is lower than it would be without the demand reduction by Austin Energy. This lower marginal price benefits all load serving entities, even if they did not deploy their demand response system – it is a system-wide benefit. In the extreme, each load serving entity prefers others to deploy their demand response systems, so that it may benefit from the resulting lower marginal prices without the cost associated with reducing demand for its own customers. To correct this imbalance, the Commission should consider establishing a mechanism to recognize the benefit to the system of actions by individual load serving entities and compensate them accordingly. This comment applies to both question 1a – regarding residential demand response programs, as well as to question 5 – regarding non-residential load-side products.

2. What market design elements are required to ensure reliability of residential demand response programs?
    a. What command/control and reporting mechanisms need to be in place to ensure residential demand response is committed for the purpose of a current operating plan (COP)?
    b. Typically, how many days in advance can residential demand response commit to being available?

Comment. I do not have a comment on question 2.

3. How should utilities' existing programs, such as those designed pursuant to 16 TAC §25.181, be modified to provide additional reliability benefits?

a. What current impediments or obstacles prevent these programs from reaching their full potential?

Comment. I have no comment on question 3.

4. Outside of the programs contemplated in Question 3, what business models currently exist that provide residential demand response?
    a. What impediments or obstacles in the current market design or rules prevent these types of business models from increasing demand response and reliability?

Comment. Alongside demand response programs that reduce demand in the face of scarcity, the Commission should consider emergency demand response programs – programs that reduce demand once the system is declared to be in a state of emergency. These emergency demand response programs should be separate from other demand response programs and should only be activated after a declaration of a state of emergency by the independent system operator. The challenge with the current system is that, under emergency conditions, prices may no longer serve as an accurate signal of the value of reducing demand across the system. In addition, the size of the current demand response programs may be inadequate to guarantee reliability – much larger programs may be required. To balance the size of these larger programs, demand reduction would occur only infrequently – and only under emergency conditions. Because of the difficulty to use a market mechanism to appropriately size an emergency demand response program, the independent system operator would need to project the amount of energy that would need to be signed, and allocate it across load serving entities. To address cases where there are differential customer profiles across load serving entities – and to minimize costs – the Commission should consider establishing a secondary market where entities that have signed more emergency demand response programs than their share can trade with entities that have signed fewer.

5. What changes should be made to non-residential load-side products, programs, or what programs should be developed to support reliability in the future?

Comment. Non-residential demand response programs allow for greater flexibility than residential demand response programs due to be the potentially bigger size associated with non-residential customers, as well as the potential for faster response. Given these differences, non-residential demand response programs can be offered not only by load serving entities, but also by generators in order to improve their reliability profile – especially at times when an emergency has been declared. To incentivize such programs, improved reliability should be rewarded by higher prices – both over periods of scarcity, and over periods when an emergency has been declared.